Joint Test and Evaluation Methodology
for
Testing in a Joint Environment

11 May 2005

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Overview

- Background: TJE Roadmap and Implementation
- Problem Statement
- Test Issues
- Test Concept
- Data Collection, Reduction, and Analysis
- Expected Products and Customers
- JT&E Schedule
- Organization

Background
TJE Roadmap

Transformation Planning Guidance

- Joint "concept-centr
  approach for capabil
  development
- Integrated architect
  define parameters o
  joint capabilities
- Need to test capabil
  and architectures in
  realistic joint
  environment

SECDEF Signed April 2003

Strategic Planning Guidance

- Need realistic T&E in
  joint operational con
- Directed D(OT&E) to
  develop a roadmap t
  identify changes
  necessary to ensure
  T&E is conducted in a
  joint environment to
  enhance fielding of
  joint capabilities

SECDEF Signed March 2004

Testing in a Joint Environment Roadmap

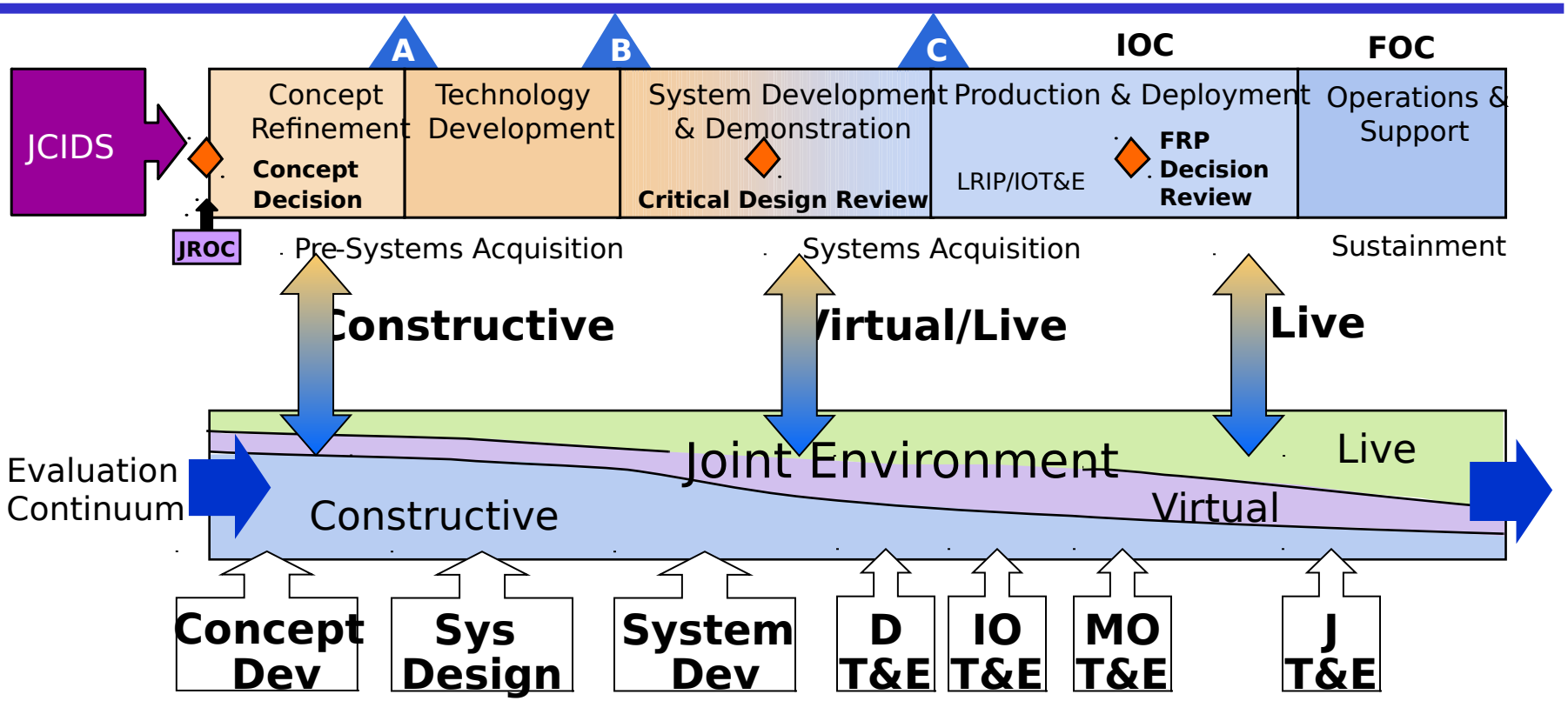
- Build Joint Mission Environment from mission requirements defined by JCIDS
- Required for entire acquisition process, no additional test
- Defines infrastructure required:
  -- Network connectivit
  -- Service environment
  -- Program-specific

DOT&E Signed November 2004

Recognized need for T&E Transformation

Background

Use of the Joint Environment



Scenarios	**Terrain**
Threat systems	**Weather**
Blue forces	**Propagation effects**
Order of battle	**Logistics**
TTPs/Doctrine	

Instrumentation
TSPI
Test/event control
Data reduction/analysis tools

Background

Joint Environment: Four Working Groups

- Infrastructure – OPR: Defense Test Resource Management Center (DTRMC) (George Rumford)
- Policy – OPR: DOT&E (George Axiotis)
- Testing Issues and Training – OPR: JFCOM/DOT&E (Greg Knapp & John Bolino)
- Methods and Processes – OPR: AFOTEC (Dr. Marion Williams)
  - Description of the joint mission environment (OPR: JFCOM)
  - How to use the joint mission environment (OPR: AFOTEC)
  - JE Program Management Office support (OPR: DTRMC)
  - Important acquisition program management responsibilities (OPR: ATEC)

Background
DOT&E Guidance

- **What It May Be**
  - Investigate/develop methodologies to determine
    - Requisite cluster of operational systems needed for particular test event
    - Acceptable mix of virtual and constructive components of that requisite cluster for that test event
  - Develop/evaluate analysis techniques to determine a system's performance in a Joint Mission
  - Investigate/Develop/Assess user tools, processes, and Test Methodologies that enable Testing in the Joint Environment
  - Provide JTTPs and processes for proper mission needs analysis and functional decomposition of Joint Missions down to the MOP/MOE level
  - Assess infrastructure solutions – recommend improvements
- **What It Is Not – JT&E is not to**:
  - Validate the Testing in a Joint Environment Roadmap
  - Determine the optimum business model for Testing in a Joint Environment
  - Develop the implementation plan for Testing in a Joint Environment

Problem Statement

Current test methodologies do not address capability assessment in joint mission environments. Nor is there a clear understanding of how to assess individual system performance as it pertains to joint mission success.

Methodology: A particular procedure or set of procedures

JTEM Methodology:

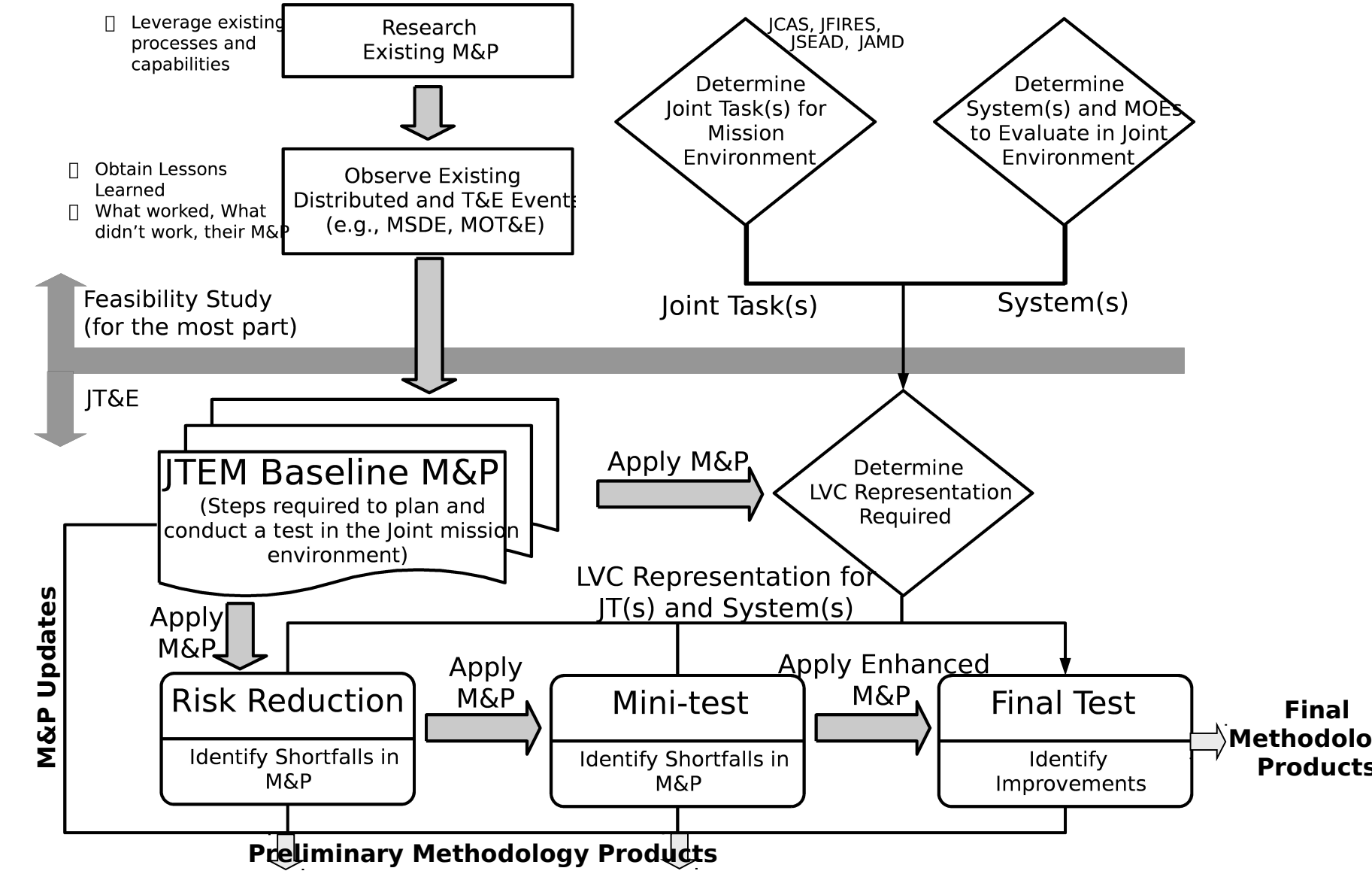
- **Decomposition of Joint Task to provide analytic/evaluation criteria**
- **Determining scenarios, systems, geographic data etc**
- **Determining data requirements**
- **Establishing L-V-C criteria**
- **Assembling the L-V-C environment**
- **Conducting an L-V-C test**
- **Assembling data products and reducing test data to analytic format**
- **Evaluating individual system performance and joint mission accomplish**

Possible Test Issues

- Issue 1
  - What are the methods for assessing joint mission success and how is the individual SUT contribution evaluated?
- Issue 2
  - How well do current policies/processes address testing in a joint mission environment? (e.g., Multi-level security/site accreditation, data management in a distributed environment, etc.)
- Issue 3
  - What are the capabilities/fidelities needed in a joint environment to properly support testing joint mission execution?

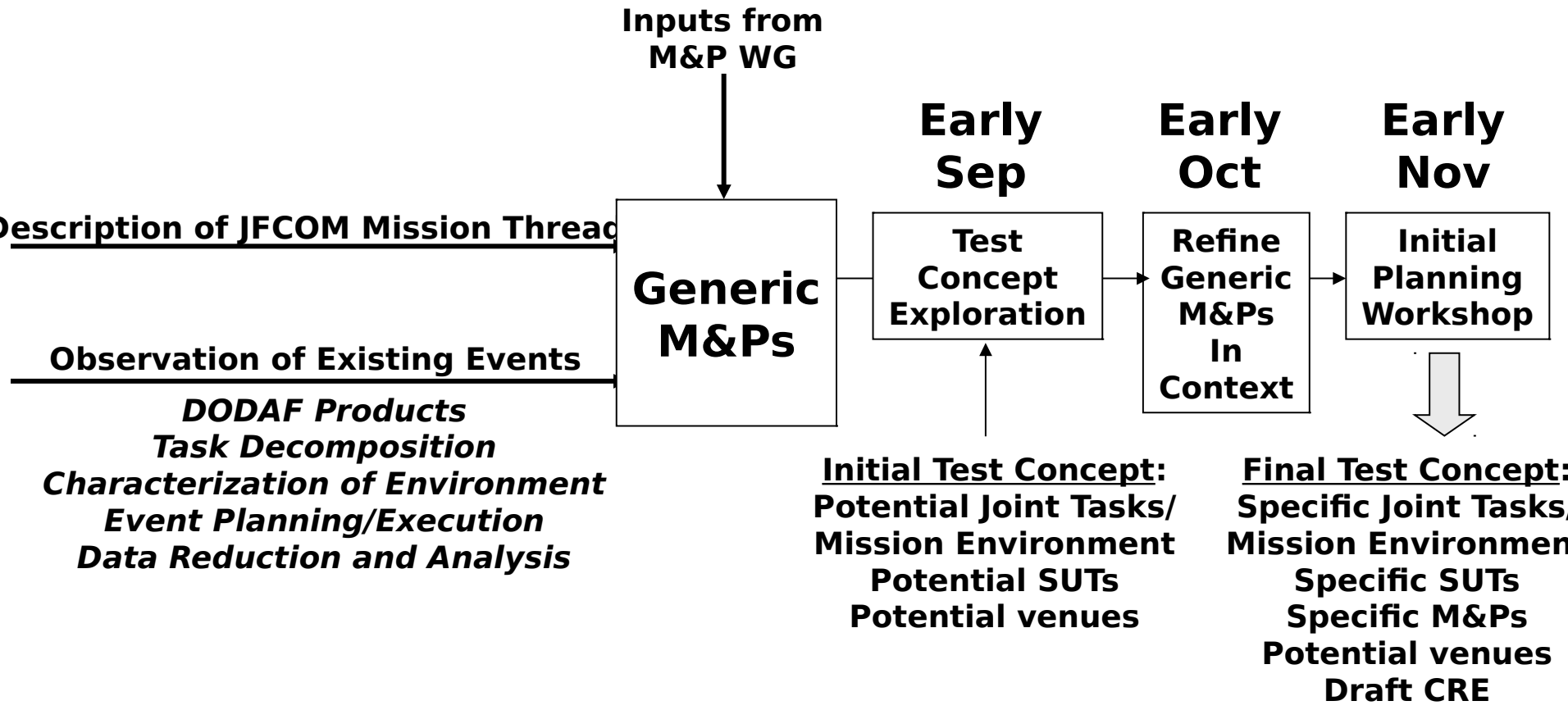
M&P WG Implementation Plan provides a starting point for issues.

Preliminary Test Concept
Overview



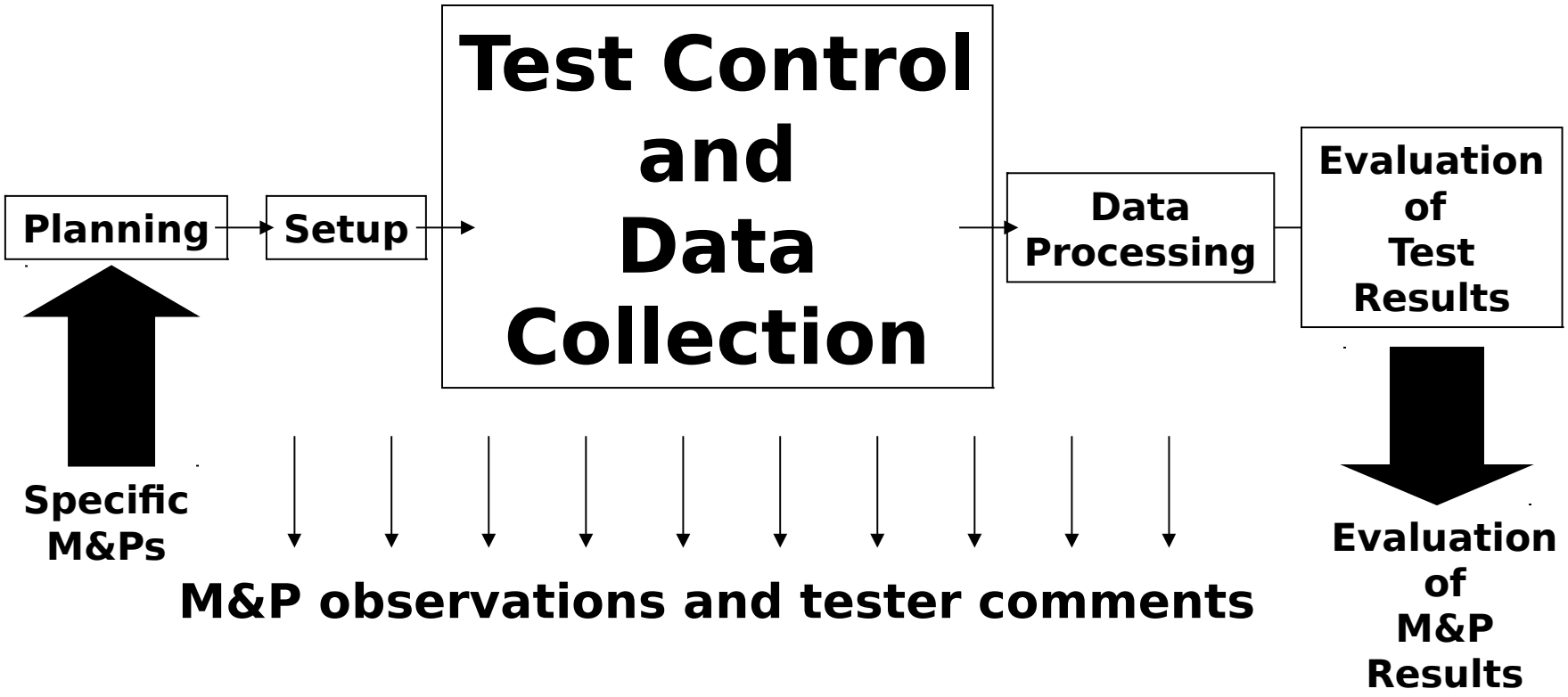
Preliminary Test Concept

JFS Activities



Preliminary Test Concept

Test Events as Forcing Functions for M&P Evaluations

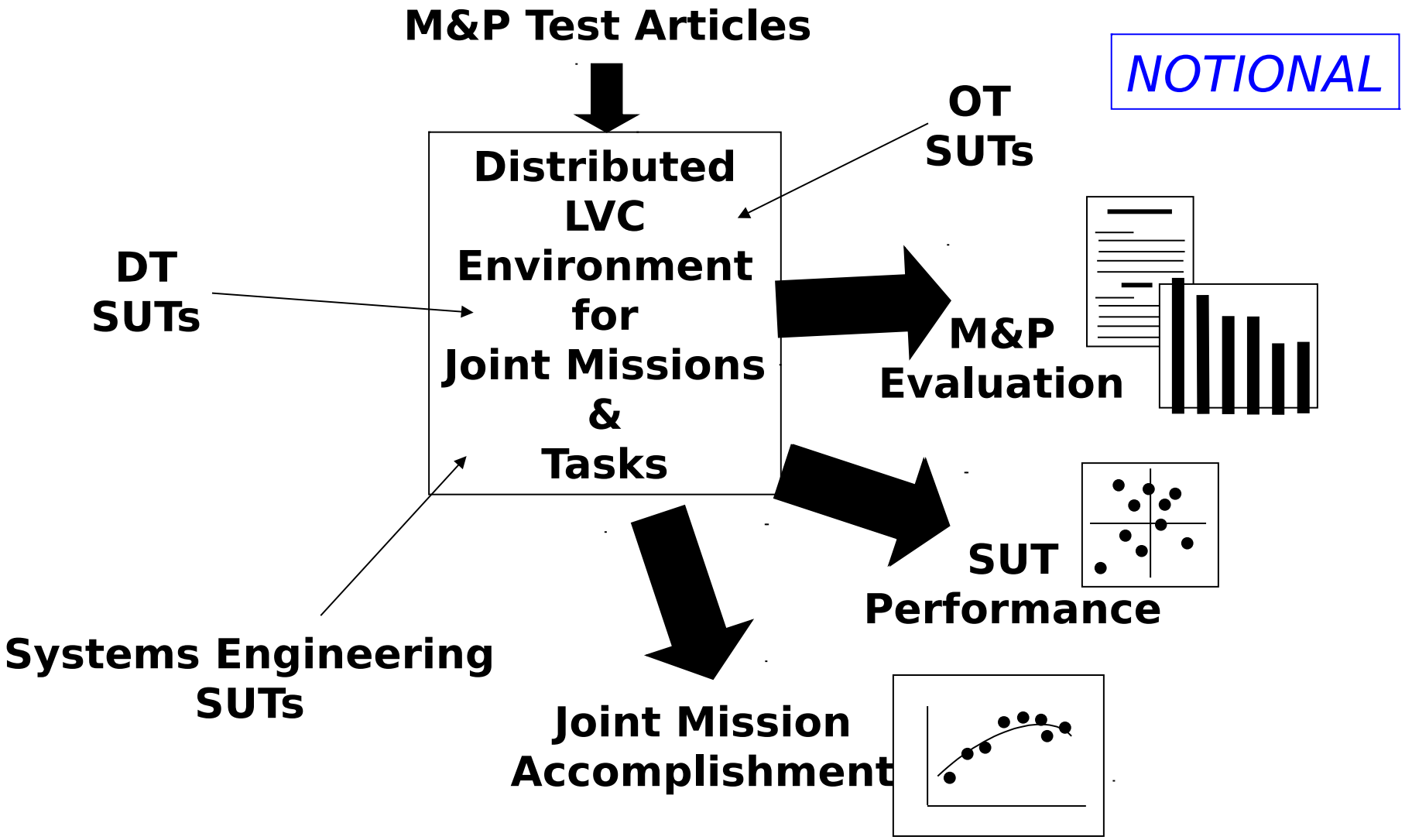


Preliminary Test Concept

Key Points Relating Test Concepts

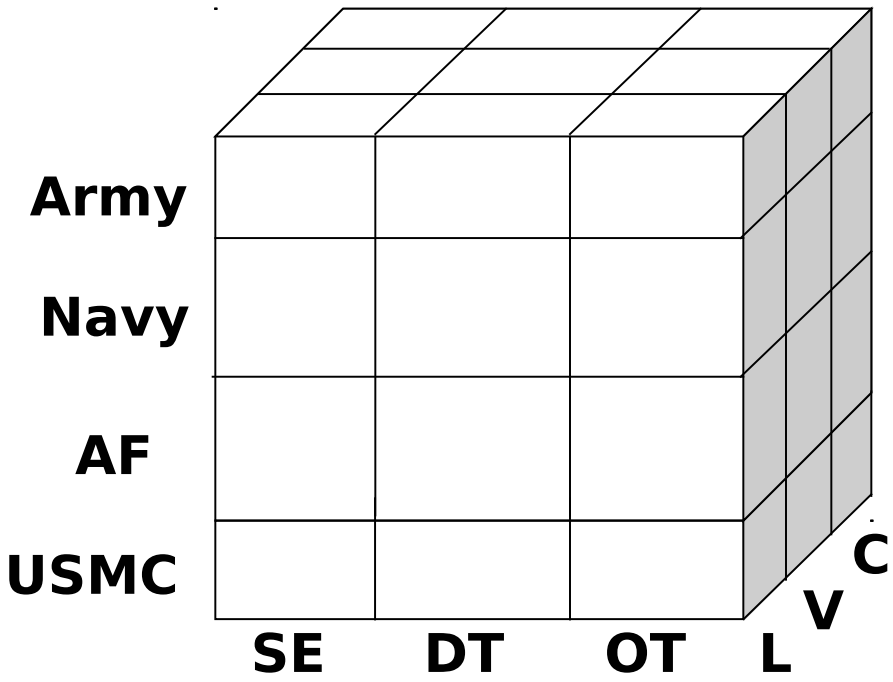
- Three levels of objectives
  - System-level test objectives
  - Joint mission-level test objectives
  - M&P objectives
- ALL objectives must be clear
- Analysis products to answer ALL objectives must be clear
- Successful M&P test can be a failure for system or mission
- Must distinguish between successful kluges and good M&Ps. Measures of goodness for M&Ps:
  - Repeatability
  - Resource requirements
  - Time

Operational Environment



Test Concept

Test Variable Matrix

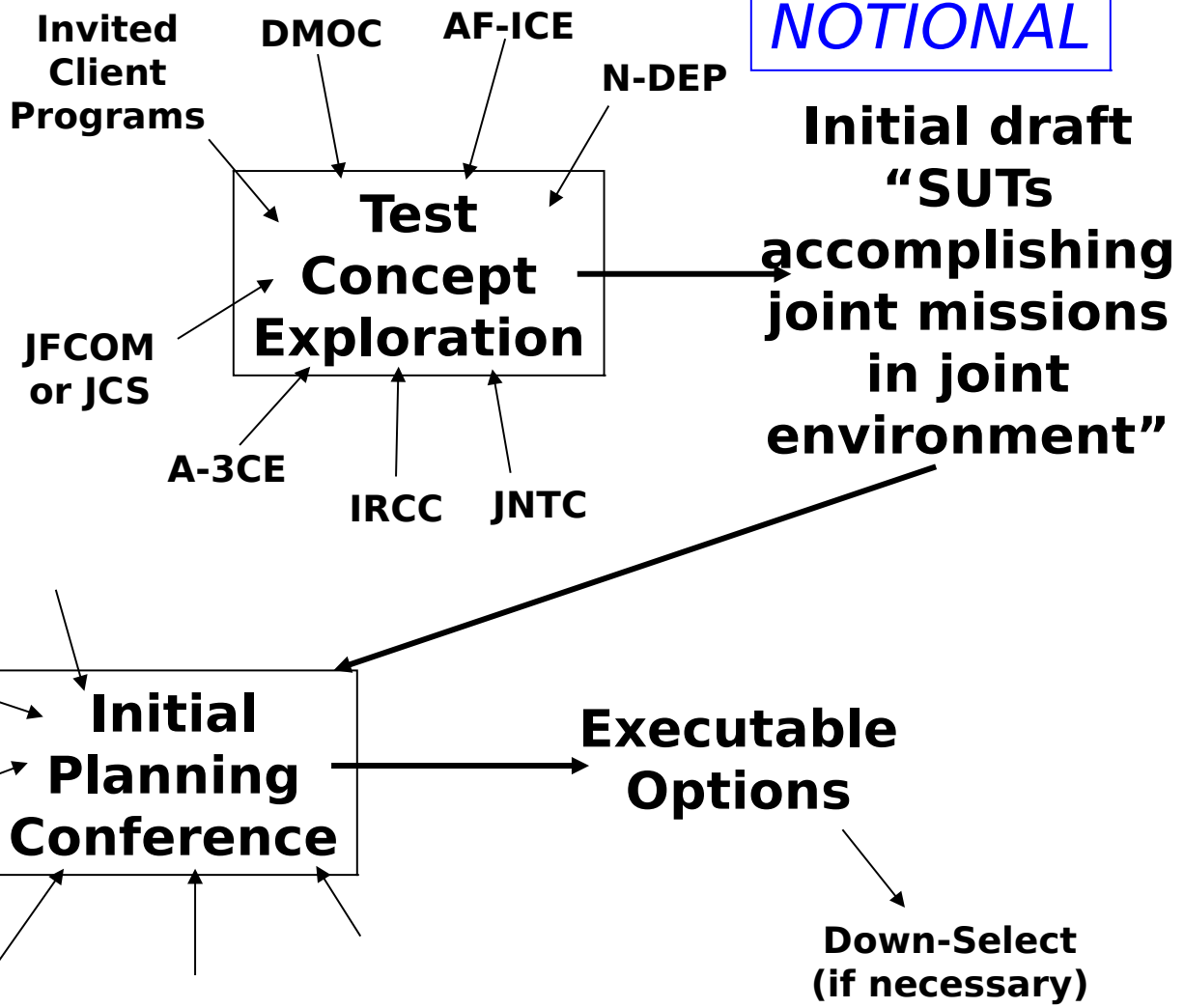


36 Combinations – can't do them all!

Test Concept
Client Program Selection Roadmap

(1) Compile list of candidate missions
(2) Compile list of candidate programs
(3) Assess candidates for suitability
(4) Coordinate w/ test agencies
(5) Down-select

NOTIONAL



Test Concept

Client Program Down-Select Process

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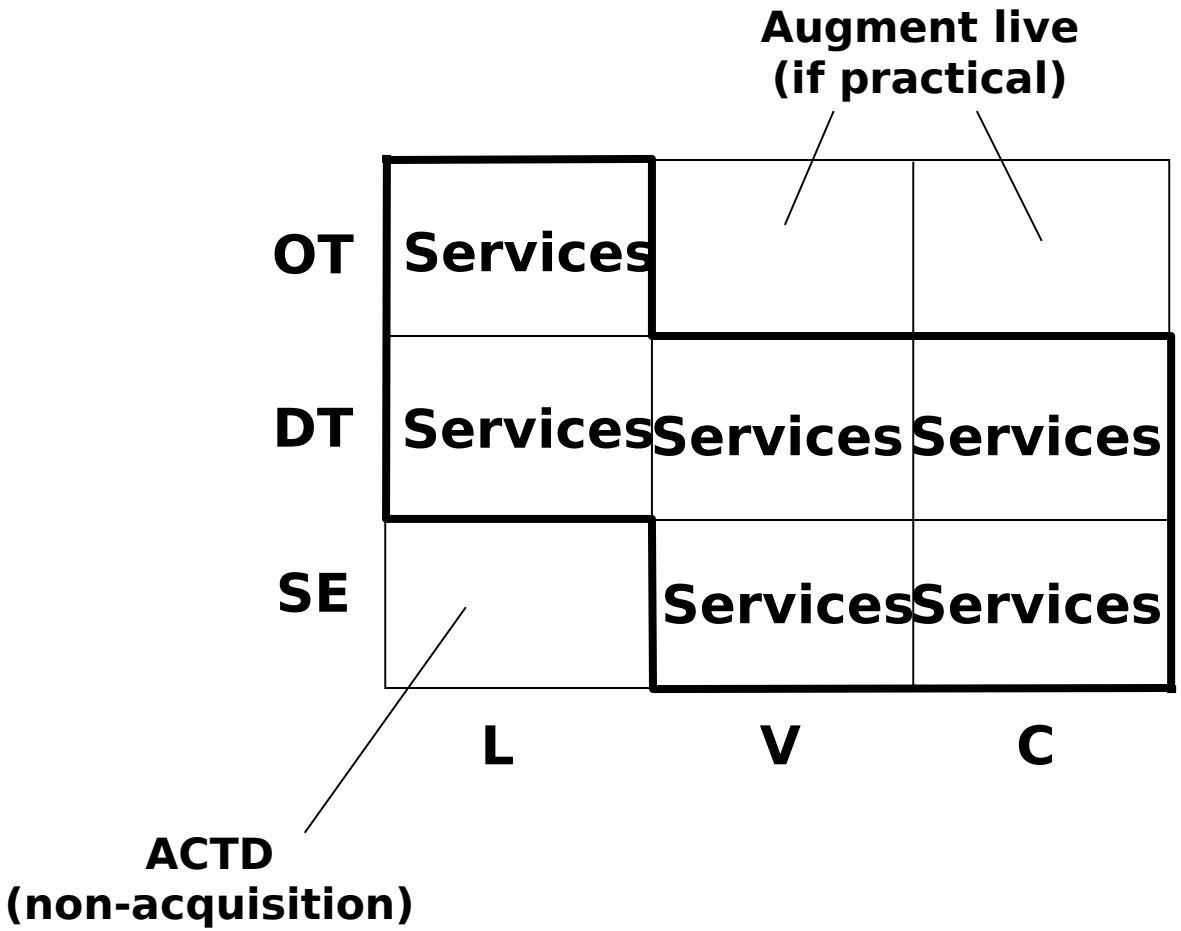
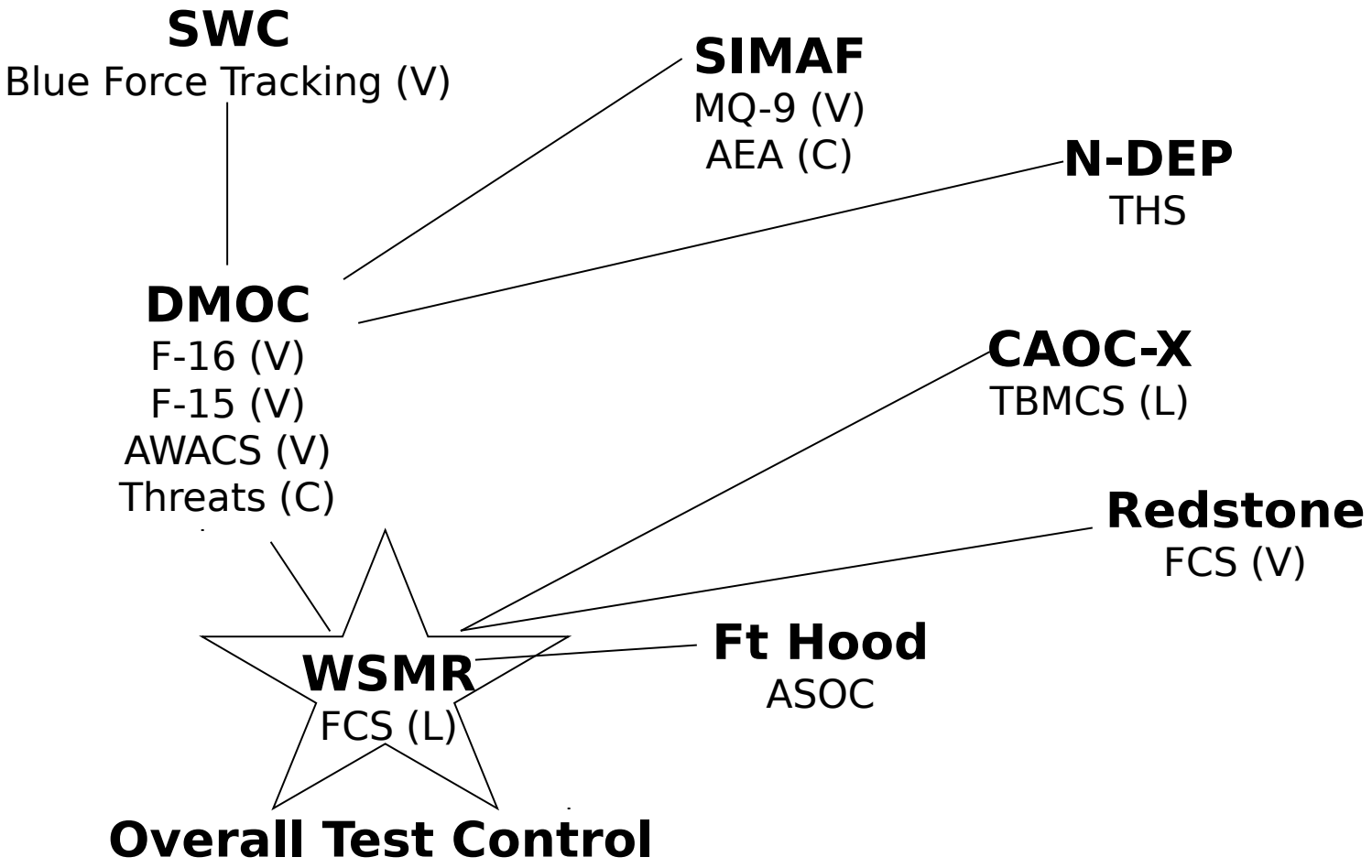


Test Concept
JCAS Sample Venue

NOTIONAL



Test Concept
M&S Considerations for Joint Environments

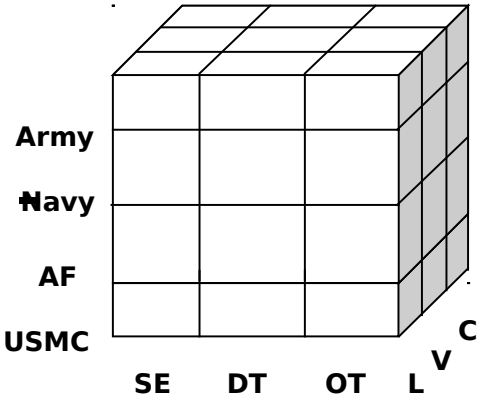
- Planning questions
  - When is a virtual representation acceptable?
  - When is a constructive representation acceptable?
  - If a virtual or constructive SUT is all you've got, which representations of supporting systems are acceptable?

- Key: The ways interactions are mechanized
  - If an interaction works OK, does it REALLY work OK?
  - Given an application, to what extent does it matter if the interaction REALLY works OK?
  - Given the application, when are non-realistic interaction mechanizations acceptable?

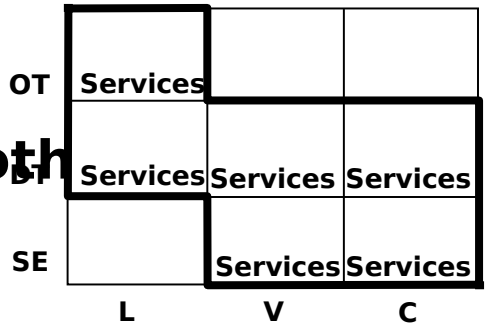
Test Concept
Limitations and Constraints

NOTIONAL

Limitation



Won't get them all, but . . .



. . . can get most of diagonal plus a few oth

Limitation – Won't get all joint missions, but . . .

- **Not all are fleshed out anyway**
- **Many use common systems**
- **Can do as many missions as practical for available SU**

Test Concept

Limitations and Constraints Continued

Limitation -- Client SUTs may be hard to come by:

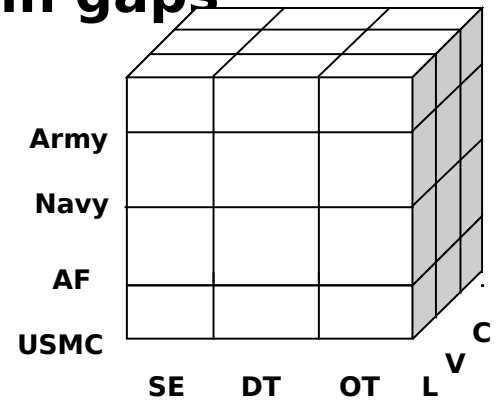
- **Programs may not cooperate**
- **Security issues may preclude robust test**
- **Proprietary models may preclude access**

NOTIONAL

Available client SUTs are limited, but . . .

. . . we can use <u>surrogate SUTs</u> to fill in gaps

F-16s
F-18s
Patriot
Aegis



. . . and this will be like the real world!

Data Collection, Reduction, and Analysis

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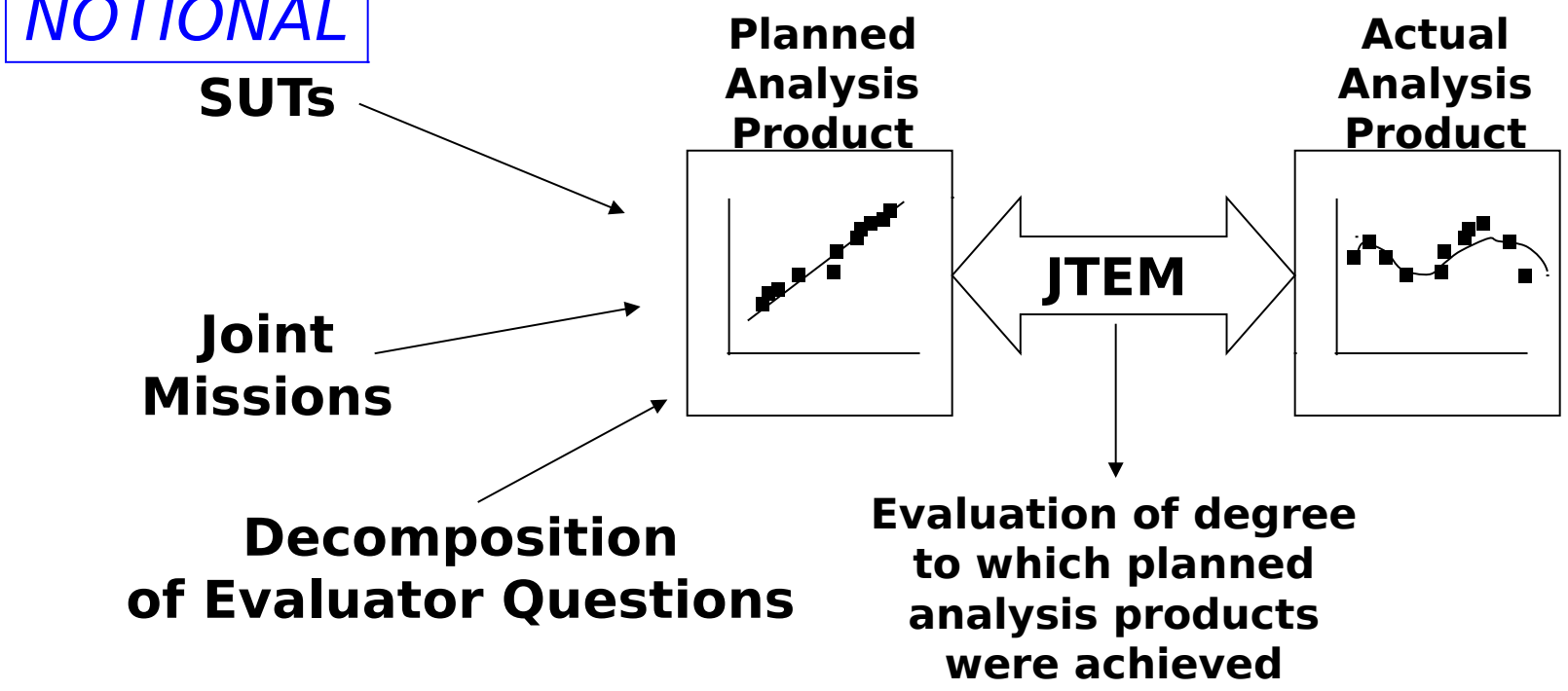


Generic M&P – JTEM observations and tester comments dur execution of generic M&P

Answer issues using above results and measures as supporting information

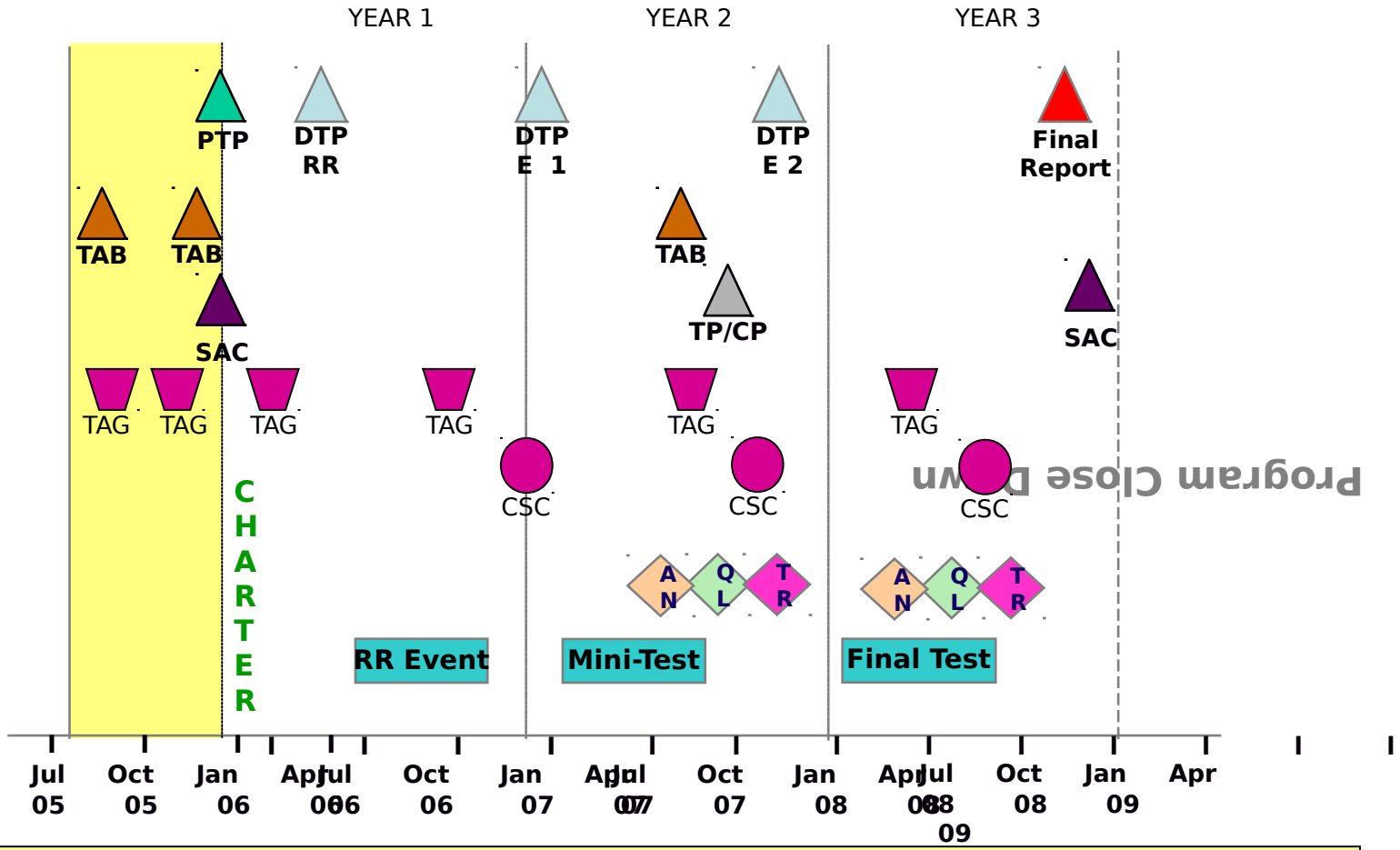
Possible Test Products

- Near term
  - Baseline methodology
  - Feedback to address M&P WG Implementation Plan issues
- Long term
  - JE processes documented in “How-To” Guides
  - Templates for language to include in various acquisition documents:
    - PMD
    - TEMP
  - Inputs to develop JE training classes at appropriate levels
    - Senior leader
    - Survey
    - Test personnel

Expected Customers

- Operational Test Agencies
- Acquisition Community
- DOT&E
- COCOMs
- JFCOM
- DISA/JITC
- Industry

Proposed JT&E Schedule



Legend:

- Program Test Plan
- Detailed Test Plan
- Closedown Plan/ Transition Plan
- Quick Look Report
- Test Event Report
- Final Report/ Lessons Learned Report
- Technical Advisory Board
- Senior Advisory Council
- Technical Advisory Group
- Customer Steering Committee
- Test Events
- Analysis

Organization

- JFS/JTF at Suffolk, VA JTSC Facility
  - DOT&E providing facility, computers, etc.
- Air Force FSD/JTD and Technical Advisor
- Army Technical Director
- Test Operations Detachment at Kirtland AFB
  - 6-8 government personnel

QUESTIONS/DISCUSSION